EL7253: State Space Design for Linear Control Systems

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Course Website: http://crrl.poly.edu/EL7253 (including homeworks & solutions & office hours)

Course Outline

1. Mathematical preliminaries (e.g., vector spaces, inner products, norms, etc.) and review of controllability and observability.
2. Linear operators, invariant subspaces, and Kalman decomposition.
3,4. Canonical forms and pole placement (full-state feedback) for both SISO and MIMO.
4,5. State reconstruction: full-order, reduced-order, and functional observers; separation principle.
6. Mathematical preliminaries (quadratic forms and $AM + MB = N$) and Lyapunov Stability.
7. Robust control.
8. Midterm.
9,10,11. Linear Quadratic Regulator (LQR) and its derivatives: both finite-time and infinite-time horizons.
11,12. Servo-Compensators and composite systems.
12,13. Kalman Filters and LQG/LTR.
14. Linear Matrix Inequality (LMI) applications for state-space control design.
15. Final.


Additional References:
1. Class notes.

Grading:
Midterm: 35%, Final: 40%, Homework: 10%, Project - 15%